Effective means and methods of teaching the rotational technique to discus throwers at the training stage

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Abstract

This scientific work comprehensively examines the theoretical and practical foundations for improving the technical preparation of discus throwers at the training and practice stage. In the course of the study, the role of athletes within the long-term training system was deeply analyzed, particularly the importance of forming technical skills during the initial and intermediate stages. Special pedagogical approaches, means, and methods were developed for the effective mastery of the rotational movement—the core element of discus throwing technique—and their effectiveness was substantiated through experimental work.

Additionally, within the scope of this research, a model framework aimed at optimizing the motor activity of discus throwers was developed. It was implemented in the training process through step-by-step instruction, the formation of a biomechanically correct movement structure, and consideration of individual characteristics. The results showed that the developed methodology serves to significantly increase the athletes' technical indicators and improve movement accuracy and efficiency.

The findings of this study are of significant scientific and practical importance for improving the training system for athletes involved in discus throwing, especially for the effective organization of technical preparation at the training and practice stage.

Keywords: technical preparation, training and practice stage, discus throw, rotational technique, long-term training, sports training, means and methods.

Introduction

Today, among athletics disciplines, the discus throw is considered one of the most technically complex and demanding in terms of coordination. Achieving high results in the discus throw is directly dependent on the athletes' technical preparation, particularly the correct and effective mastery of the rotational technique. Therefore, it is crucial to organize the process of teaching discus throwers the rotational technique on a scientific basis, starting from the initial periods of their multi-year training. Currently, there are certain methodological shortcomings in teaching discus throwing techniques in sports schools and training groups, which can hinder athletes from fully and correctly mastering the technique. Specifically, it is necessary to use effective methods when teaching elements such as the sequence of movements during the rotation phase, maintaining balance, and harmonizing strength and speed. For this reason, enhancing the effectiveness of the process for teaching the rotational technique to discus throwers at the training stage, developing a new system of exercises, and providing methodological recommendations are pressing issues.

Research Aim: To increase the effectiveness of discus throwers at the training stage by developing a methodology for teaching the rotational technique.

Research Objectives:

1. To study, analyze, and synthesize the scientific and methodological literature on the topic;
2. To assess the physical and technical-tactical preparedness of discus throwers at the training stage;
3. To develop a methodology for teaching the rotational technique to discus throwers in a training group and to substantiate it through a pedagogical experiment.

Results and discussion

In the training process for discus throwers at the instructional-training stage, the correct formation of the turning technique is a crucial methodological task for developing an athlete's technical skill. At this stage, special attention is given to increasing rotational speed, improving movement coordination, and ensuring an optimal transition into the final power phase. Special preparatory exercises performed with alternating leg support play a significant role in increasing rotational speed. Specifically, exercises involving the active forward swing of the right leg from the support position help develop rotational dynamics and are methodologically important for establishing movement speed in athletes. In some cases, there is a view that ro-

Table. Model for improving the technical preparation of female discus throwers

Section	Content
Objective	Effective Development of Rotational Technique in Female Discus Throwers
Theoretical Foundations	- Foundational Principles - Age and Gender Characteristics - Individualized Approach - Biomechanical Laws
Technical Phases	1. Starting Position 2. First Turn 3. Transition Phase 4. Final Release
Pedagogical Process	1. Teaching Elements (rotation without weight, semi-circle) 2. Combining Phases - Sequential linking of movements
Monitoring and Evaluation	- Throwing Distance - Technical Accuracy (errors) - Balance Stability - Movement Velocity (s, deg/s)
Outcome	- Technical Consistency - Increased Distance

tational speed can be increased by actively swinging the hand holding the discus or by sharply turning the shoulder girdle. However, such actions are not recommended for athletes at the instructional-training stage.

This is because this can reduce the necessary muscle tension and disrupt the biomechanical integrity of the "thrower-implement" system. As a result, the athlete finds themselves in an awkward position upon reaching the final power phase.

This complicates the process of controlling the discus and leads to a decrease in throwing efficiency. Therefore, during the turning process at the instructional-training stage, it is important not to strive for an excessively fast rotation of the shoulder girdle, but rather to maintain the rhythm and coordination of the movements.

The use of a theoretical and methodological model is crucial for the effective organization of the process of teaching discus throwers the rotational technique. This model is aimed at the gradual formation of the rotational technique in athletes, ensuring the correct execution of technical movements, and increasing throwing efficiency.

The main goal of the model is to scientifically form and improve the rotational technique in female discus throwers, with special attention given to developing the athletes' motor coordination, balance, speed, and strength qualities.

When teaching the rotational technique, the principle of gradual progression is followed; that is, technical movements are taught by moving from simple elements to more complex ones. At the same time, the age and physical development characteristics of the athletes are taken into account, and an individual approach is applied to each athlete. Furthermore, relying on the biomechanical laws of rotational motion contributes to the effective execution of technical actions.

In discus throwing, the rotational technique consists of several main phases that are performed in a closely interconnected manner. First, the athlete assumes the starting position, where a state of readiness for the throw is established while maintaining body balance. In the next stage, the first turn is performed, where the athlete initiates the movement by turning the torso on the supporting left leg.

Following this, the transition phase is executed, during which the feet change position and the body moves forward. In the final stage, the release phase is performed, and the discus is thrown with maximum force and speed. Teaching the rotational technique is carried out through a pedagogical process. Initially, individual elements of the technical movements are taught, such as performing rotation or half-rotation exercises without a discus.

Subsequently, these elements are combined to form a complete technical movement. During the training process, attention is focused on maintaining balance, correctly executing the rhythm of the movements, and gradually increasing the speed of rotation.

A monitoring and evaluation system is

used to determine the athletes' level of preparedness. In this system, indicators such as throwing distance, the precision of technical movements, balance stability, and movement speed are assessed.

These indicators make it possible to determine the effectiveness of the training process and monitor the level of technical readiness. Consequently, training sessions organized based on this theoretical and methodological model contribute to the stable formation of rotational technique in female discus throwers, an increase in technical skill, and an improvement in throwing distance.

This approach is of significant methodological importance for organizing the athlete training process on a scientific basis and achieving high athletic results. For discus throwers at the training stage, the rotational movement typically begins with a turn on the ball of the left foot, involving the harmonious participation of the entire torso.

The thrower pushes off with the right foot, slightly rotates the pelvis, and transfers body weight to the left leg. As a result, the athlete's legs assume a support position, turned slightly outward at the knees. After pushing off, the bent right leg actively sweeps around the rotating left leg and steps toward the throwing direction.

During this process, the torso's rotation to the left slows down relatively, which helps the athlete maintain balance. The pre-tensioning of the hip flexor and extensor muscles aids in the rapid and effective straightening of the leg. Developing these specific muscle groups during the training stage positively impacts the effective execution of the rotational technique. A stable support position on the left leg during the turn is a crucial biomechanical condition for actively performing movements in the single-support phase.

As the right leg is brought forward, the pelvis also rotates, which ensures the thrower's forward progression through the rotation. Lifting the thigh too high can cause the torso to rise vertically, resulting in an increased duration of the non-support (flight) phase. A strong upward push-off with the left leg can also cause similar biomechanical outcomes.

During the turn, the right hand holding the discus is usually positioned behind the right leg. Initially, it drops slightly with the rotation of the left leg and then rises naturally. However, artificially performing this movement during the training stage is not recommended, as it can lead to technical errors. Dropping the arm excessively at the beginning of the turn causes a number of flaws in the discus throwing technique. If the athlete begins the rotation in a relatively upright position, the arm's movement will occur in a path close to the horizontal plane, which helps maintain stable control of the discus.

Forming and perfecting the rotational technique is a key methodological task in the training process for discus throwers at the initial training stage. At this stage, athletes develop skills in coordinating movement, maintaining balance, rotational speed, and correctly executing the sequence of technical movements. To develop the rotational technique, it is recommended to use special preparatory and supplementary exercises.

1. Turning on the spot

The thrower stands in a position similar to the throwing circle and performs slow turns on the ball of the left foot. The main goal of this exercise is to develop the skill of maintaining balance and controlling body movements during the turn.

2. Pivoting on the ball of the left foot

The thrower pivots on the ball of the left foot from a support position, while the right leg moves freely. This exercise helps in mastering the initial phase of the spin technique.

3. Driving the right leg forward

While performing the rotational movement, the thrower quickly and actively drives the right leg forward. This exercise serves to increase hip rotation and movement speed.

4. Turning without a discus

The thrower executes the turning technique without holding a discus. This exercise helps the athlete to properly master the sequence of movements and reduce technical errors.

5. Turning with a light discus

Throwers perform the rotational technique with a reduced-weight discus. The exercise helps increase rotational speed while maintaining motor coordination.

6. Exercise for coordinating hip and shoulder movements

The thrower practices the coordinated movement of the hips and shoulder girdle during the rotation. This exercise helps maintain the integrity of the "thrower-implement" system.

7. Balance development exercise

The thrower performs preparatory exercises for the turn while standing on one leg. This exercise serves to increase stability during the support phase.

8. Throwing with a half-turn

The thrower throws the discus after a half-turn. This exercise teaches the transition from the rotation to the final power delivery phase.

9. Throwing with a full turn

The thrower performs a full turn and throws the discus. The exercise helps to form the continuity and rhythm of the technical movements.

10. Rapid rotation exercise

Throwers perform rapid rotation exercises without a discus. This exercise serves to increase rotational speed and develop the dynamics of the movements.

Overall, for discus throwers in the training stage, the biomechanically correct formation of the rotational technique is an important factor in increasing the athlete's speed of movement, ensuring technical stability, and enhancing the effectiveness of the final power delivery phase.

Conclusion

The results of the analysis indicate that a scientifically-based approach to teaching the rotational technique to discus throwers during the training phase is crucial for the effective development of their technical preparation. The step-by-step instruction of the rotational technique, thorough mastery of individual elements of the technical movements, and their integration into a unified system help develop athletes' coordination, balance, and speed.

During training sessions, specialized preparatory exercises—particularly the alternating action of the legs on the support, the active forward drive of the right leg, and coordinated rotational movements of the torso—contribute to the correct formation of the technique.

Furthermore, avoiding excessively sharp turns of the shoulder girdle during the rotation and maintaining the biomechanical integrity of the "thrower-implement" system are important factors in increasing throwing efficiency. In the monitoring and evaluation process, using indicators such as throwing distance, technical accuracy, balance stability, and movement speed makes it possible to determine the athletes' level of technical preparedness.

As a result of training organized according to the proposals and recommendations above, discus throwers demonstrate a stable formation of the rotational technique, an increase in technical skill, and an improvement in throwing results.

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